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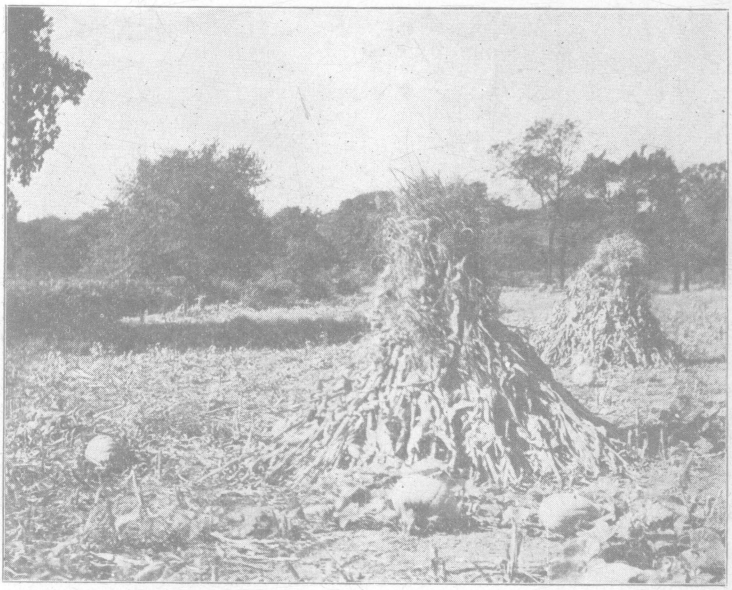
GRASSHOPPERS AND CRICKETS

BY PROFESSOR HERBERT OSBORN



L. C. Randall.

And the landscape through the haze,
Of a crisp and sunny morning of the early autumn days,
Is a picture that no painter has the colorin' to mock—
When the frost is on the pumpkin and the fodder's
in the shock.—*Riley.*

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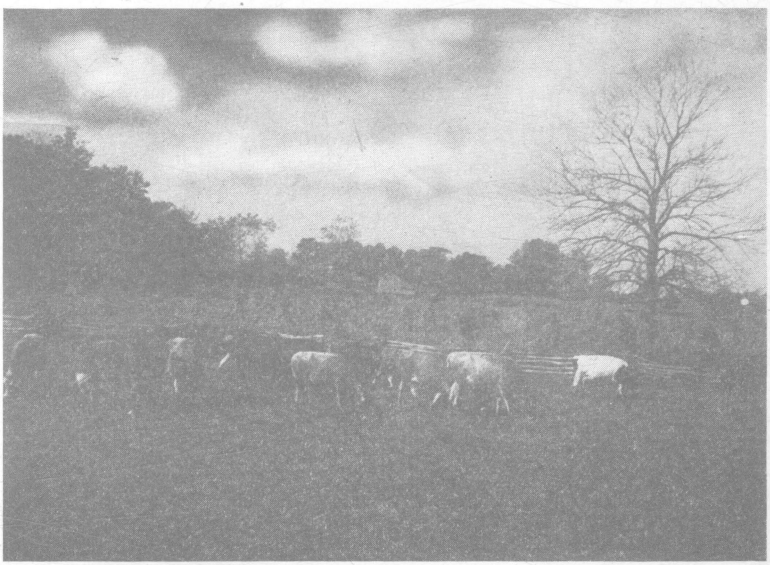


We often praise the evening clouds,
  And tints so gay and bold,
But seldom think upon our God,
  Who tinged the clouds with gold.

Walter Scott.

October's Bright Blue Weather

O, suns and skies and flowers of June,
    And clouds of June together,
Ye cannot rival for one hour
    October's bright blue weather

When loud the bumblebee makes haste,
    Belated, thriftless, vagrant,
And golden-rod is dying fast,
    And lanes with grapes are fragrant,

When gentians roll their fringes tight,
    To save them from the morning,
And chestnuts fall from satin burs
    Without a word of warning,

When on the ground red apples lie
    In piles, like jewels shining,
And redder still, on old stone walls,
    Are leaves of woodbine twining,

When all the lovely wayside things
    Their white-winged seeds are sowing,
And in the fields still green and fair
    Late aftermaths are growing,

When springs run low, and on the brooks,
    In idle golden freighting,
Bright leaves sink noiseless in the hush
    Of woods for winter waiting,

O, suns and skies and flowers of June,
    Count all your boasts together,
Love loveth best of all the year
    October's bright blue weather.

—*Helen Hunt Jackson.*

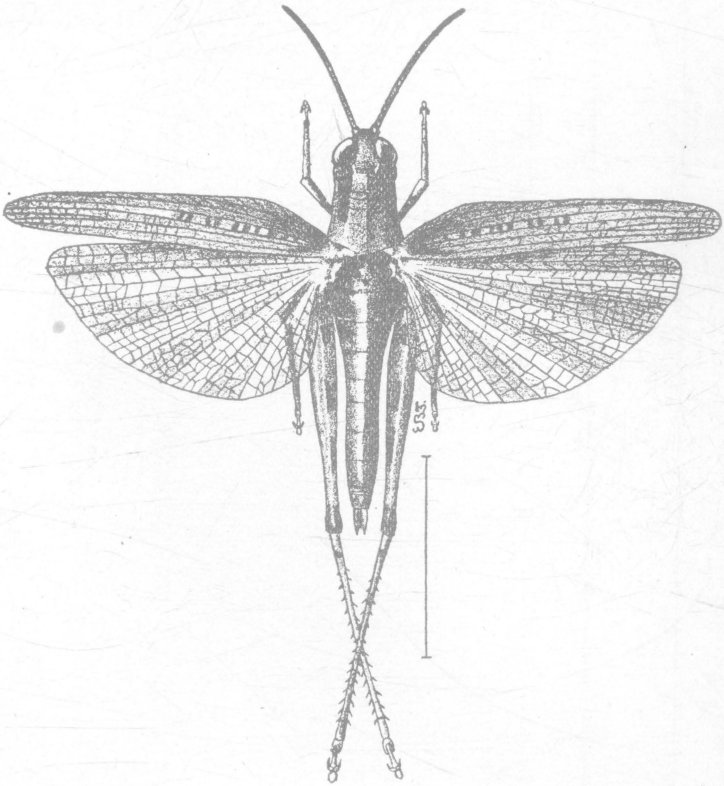
GRASSHOPPERS AND CRICKETS

PROFESSOR HERBERT OSBORN

Among the most familiar insects, especially at this season of the year, are the grasshoppers and crickets which abound in fields, along roadsides, and in gardens.

THE RED-LEGGED LOCUST

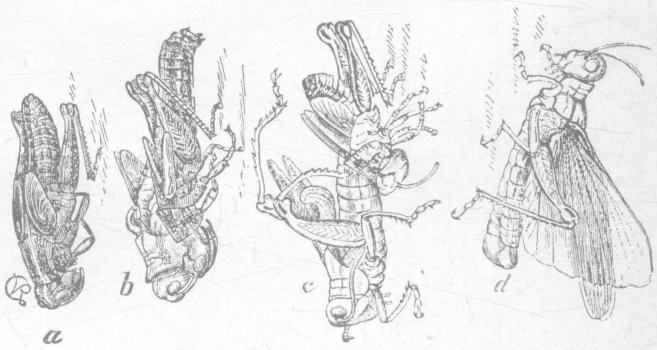
One of the species most likely to be observed in this state is the red-legged locust, which is to be found in almost any pasture or meadow. Most of the individuals at this time (October 1st) are adults, but occasionally immature individuals may be seen. The adults have fully developed



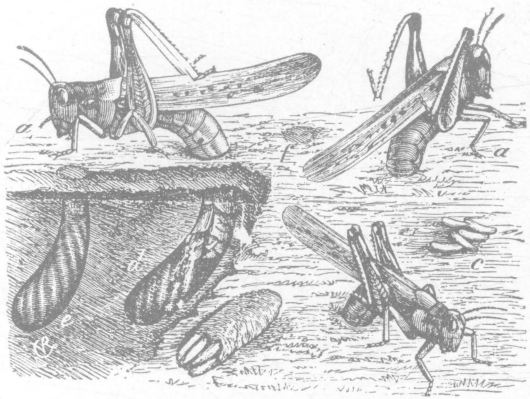
Red-legged locust (*Melanophus femurrubrum*) much enlarged; actual length shown by hair line at right. (After Lugger.)

wings while the immature individuals have short wing pads folded over the back. The full winged individuals do not fly very far, but when disturbed will jump in the air, fly for a few feet, possibly a rod or two, and alight. In this respect, this species differs very much from the destructive Rocky Mountain locust, which at times may fly for two or three hundred miles.

During the last of September and in October the females will be found depositing eggs, a process which may be easily observed in almost any pasture. They select paths or places where the earth is packed quite hard by the tramping of stock; the abdomen is pushed down into the earth, the sharp egg guides serving as a sort of auger to bore into the ground. The eggs are placed at a depth of one half to one inch beneath the surface, and are held together in a compact mass by a glutinous substance which hardens and serves as a protective covering for the eggs during the winter. The hatching of these eggs does not occur until May or June of the coming season, although if kept in a warm room they may hatch considerably earlier.



Rocky Mountain Locust, showing process of moulting in change from young to adult. (After Riley.)



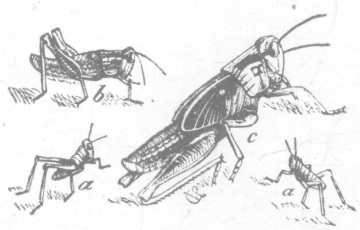
Rocky Mountain Locust laying eggs: *a*, *a*, adult females; *c*, eggs; *d*, *e*, egg masses. (After Riley.)

The young grasshoppers are similar in shape to the adults but the head is proportionately very much larger than the body and no trace of the wing is to be seen. By growth and successive molts or shedding of the outer skin the young grasshopper gradually acquires the shape and size of the adult, the wings appearing first as minute pads and not acquiring full length until the final molt. About four or five molts occur before they become adult.

The young grasshoppers will become conspicuous in grass land during July, and full winged individuals may be found as early as the latter part of the same month.

The grasshoppers of this species remain quite constantly in grass land, unless the vegetation becomes so scant that they cannot secure sufficient food, in which case they will migrate to adjacent fields, possibly

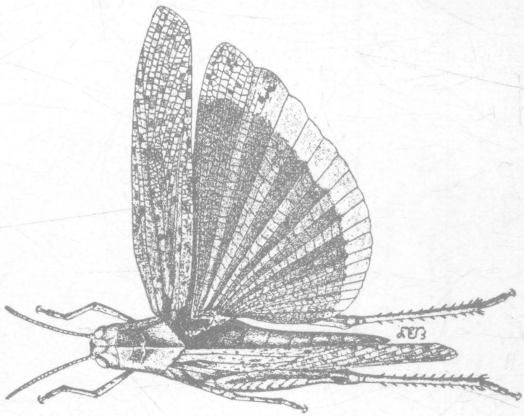
to orchards, where they may cause considerable injury. In pastures the damage occasioned is easily overlooked, as they feed upon the grass leaves often cutting the leaf so that the outer part falls to the ground and withers, but they do not kill the plant outright. The part eaten away is replaced by later growth, just as if eaten by stock. A little consideration, however, will convince anyone that when grasshoppers are numerous they may dispose of as much pasturage as the stock which may ordinarily pasture on the same area.



Young Grasshoppers. *a*, *a*, newly hatched; *b*, half grown; *c*, pupa. (After Riley.)

THE DUST-HOPPER

Another quite familiar species of grasshopper or locust is the one called the Dust-hopper. This is a quite conspicuous form when flying, as it has black hind wings with a conspicuous yellow border, which appears very noticeable when the wings are spread, but as soon as it alights these conspicuous wings are covered by the dust colored front wings and the whole insect blends so perfectly with the color of the earth on which it rests that it is practically invisible. During autumn they rest most frequently in paths or roads, or on bare ground where this color serves to protect them. Earlier in the season, and during the younger stages, they are feeding upon grasses or other plants.



Dust Hopper (*Dissosteira carolina*) enlarged; natural size shown by hair line at bottom. (After Lugger.) The figure shows the insect a little enlarged, and the coloring of the broad hind wing is indicated.

As with the preceding species, eggs are deposited in autumn and survive the winter to hatch in spring or early summer. These are seldom as abundant as the preceding species but they may be numerous enough to cause quite an amount of injury in the fields where they develop.

THE CRICKET

We have several different kinds of crickets in Ohio, but one that is perhaps most abundant and which may be taken as an example is the

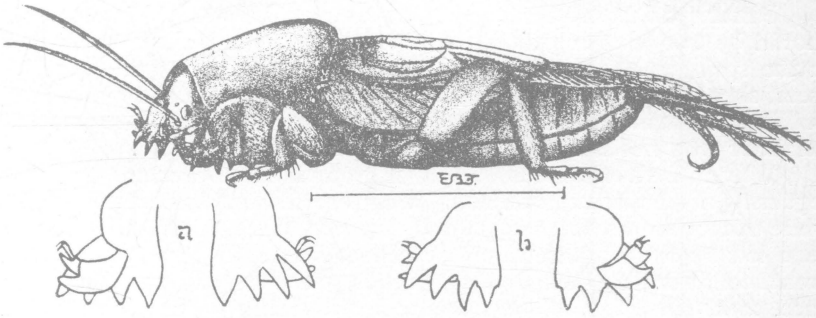
common cricket, a black species which occurs both out of doors and during autumn and early winter, within doors, where its familiar song is so well known as to need no description. The method of producing the note is to scrape the ribs of the front wings, producing a vibration of the membrane, thus causing a loud, resonant sound. This is produced by the males only, the wings of the females being simpler and not fitted with the rasping organ.

Crickets are sometimes very annoying both in fields and in houses, by eating holes through clothing that they may get access to, especially garments which are left upon the ground or on hay-cocks or shocks of grain in fields.

Common Cricket (*Gryllus abbreviatus*). Female enlarged. (After Riley) Note wings and long ovipositor.

THE MOLE CRICKET

The mole cricket is a quite remarkable form, fitted for underground life and consequently not very frequently observed. The body is covered with a minute velvety clothing, which doubtless protects the insect in its moist underground locations, and perhaps the most striking feature is found in the peculiar toothed front legs which are fitted for burrowing in the soil. The character of these expanded toothed structures are well shown in the accompanying photograph, which illustrates the long winged form of the mole cricket. Occasionally these insects attack the roots of crops or the tubers of potatoes and cause considerable damage. Ordinarily, however, such damage is little known and may readily be referred to other causes.



Mole Cricket: *a* and *b* show toothed tibiae for burrowing. These figures are considerably enlarged, but the actual length is shown in the lines accompanying the figure.

BEAUTIFY THE SCHOOL GROUND

Public sentiment, not money, makes of the country school ground a place to be long remembered for its beauty or to be ever suggestive of the public's indifference as to children's appreciation of beautiful and cheerful surroundings.

In the school room and on the playground small children spend nearly one-half the time they are awake during the school year. This early period is the most impressionable. Tastefully papered or frescoed walls and ceilings, well selected pictures, a black stove, and clean woodwork and windows should have their counterpart in well planted trees, vines, and flowers on the school ground.

Public sentiment was right twenty years ago. It's right today. The people believe in the refining influence of trees, flowers, and green lawns.

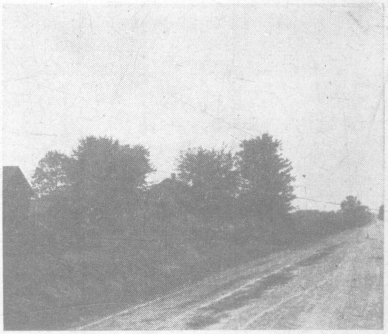
Putting off from year to year never plants a tree or flower. There should be two planting days each school year—one in the fall and one in the spring. With or without the Planting Day program—plant. If trees, shrubs, vines, or flowers are destroyed, plant again and again until public sentiment will protect the school ground against the indifferent neighbor who persists in allowing his stock to graze there.

Why is it that some Ohio school grounds have been mowed just as regularly as the home grounds? Why are some grounds well planted, while others are as bare as the roof of the house? Some children have been led by a fond parent to the school house door that must be approached through a hedge of rag weeds. If the yard has been mowed once, and that just before school opened, think of the sore toes and snagged feet. Think of the scorching hot sun. Where is the play house? In the sun. Where are the small boys' stables? In the sun Everything

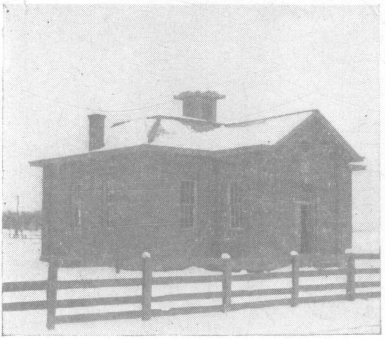
Putting off from year to year has not planted a tree.

Trees have been planted three times. A public pasture and watering place tells the story.

Sunshine will not purify stagnant water in a school well. Not a tree or shrub in this yard.



The nearest farm house. Beautiful trees, flowers and a well-trimmed lawn.



Nothing planted on this ground. How much a snow laden bush or evergreen would add to its beauty.

The usual vacation lawn-mower. Is a school-ground worth giving the attention one should give to the yard at home?

and everybody in the sun, is it any wonder that some of our country boys and girls wish they could attend the village school where there are trees, flowers, and a well mowed lawn.

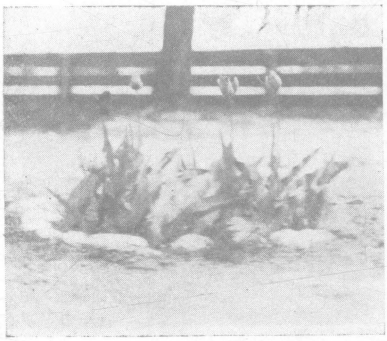
A teacher who will lead a few willing patrons can in a few years transform a bare school ground into a country park that every one is proud of. The illustrations make unnecessary additional words.

Below is found the names of a few plants for fall or spring planting:

FLOWERS

NAME.	TIME OF BLOOMING.
Common peonies	May and June.
Narcissus and daffodil	April and May.
Tulips (6 to 8 in. deep—Fall)	April and May.
Crocuses (3 to 4 in. deep—Fall)	March and April.
Tuberose (3 to 4 in. deep—Spring)	September.
Canna (6 to 8 in. deep—Spring)	August and September.
Dahlia (6 to 8 in. deep—Spring)	August and September.
Hardy Chrysanthemum	September to November.

Castur bean plant, fall roses or cultivated asters, cosmos, zinnias, and golden glow (sow seed in spring before school closes).



Tulips on a country school ground. Bulbs planted in October.

Dog-wood in full bloom. Nothing prettier for the school ground.

TREES AND SHRUBS

NAME.	TIME OF BLOOM.	COLOR.
Dogwood	May	White.
Flowering Almond	May	Pink.
Snowdrop	April and May	White.
Japanese Quince (Japonica)	April and May	Scarlet.
Bridal Wreath (Spirea)	May	White.
Lilac	May	White and purple
Honeysuckle	June	White and pink.
Smoke Tree	June	Reddish purple.
Syringia (Mock Orange)	June	White.
Snowball	May	White.
Rose of Sharon	Sept. and Oct.	White and rose
Hardy Hydrangia	Aug. and Sept.	White.
Hybiscus	Aug. and Sept.	White and rose.

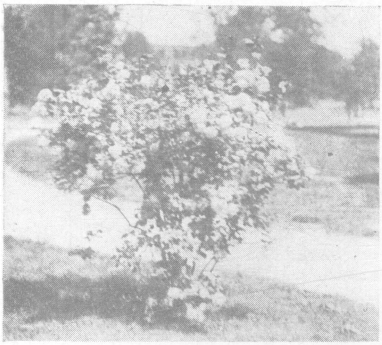
Our native forest trees are best for school grounds.

Why should not a fruit tree or grape vine be planted?

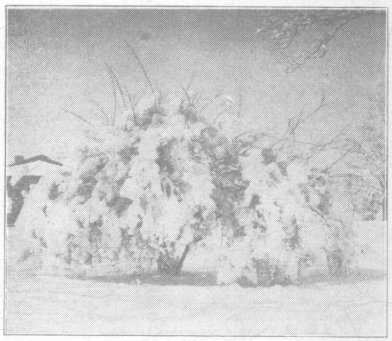
Shrubs, bushes, and bulbs can usually be secured from homes where there are now more than are needed. Learn when there is to be a thinning out on the home grounds.

WHAT TO OBSERVE IN OCTOBER

There are many beauitfully bound Nature Books with catchy titles, telling us many instructive and exceedingly entertaining stories of plant and animal behavior. The question, "How did the author acquaint himself with these facts?" should arise in the mind of the reader. Has it ever come to your mind that you may acquire the habit of carefully observing. You may not write a book, but you may be helped to see more by consulting a book written by a careful observer. The habit of seeing



Snow-ball in full bloom. Just before school closes.



Plant a bush, shrub or tree that contributes something to the beauty of the school ground on a snowy morning.

and hearing accurately may prepare you to appreciate the common things around you and to verify or criticise statements and illustrations found in books.

How does the locust or cicada make its rasping noise?

Steal quietly to the spot where a cricket is making its noise. Can you see how it does it?

How many different calls have you heard the blue jay make? Have you heard a robin this month? Have the crows gone away? If not, when will they go?

Where are the purple martins that usually build in bird boxes in villages?

Does golden rod usually grow in a little colony or not?

Do you find asters growing in colonies?

Do you find golden rod and asters where they were last fall?

Will sweet clover surrender its place to other plants? Why?

Carefully pick off the top of a single plantain seed pod. What is the difference between this and a bean pod?

How do the following scatter their seeds: lady-clipper, mustard, wheat, thistle, Spanish-needle, milkweed, ash, hickory, and wild parsnip?

What becomes of the wooly-bear or ague worm? What becomes of the many so-called green worms?

Have any trees or shrubs next springs' buds on them now?

Will the leaves drop off if there is no frost?

Do moths fly at dusk or in daylight?

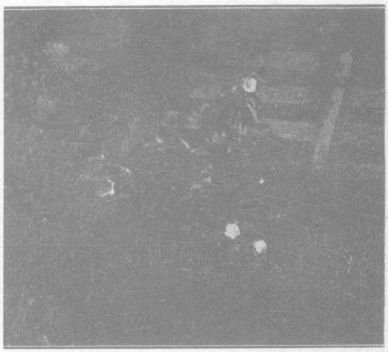
Why do butterflies go to thistle bloom?

Do honey and bumble bees get honey from the asters and golden rod?

Do the worker honey bees do anything to dispose of the drones at this time of the year?

How much farther does the sun shine in at the south door or window than it did in September.

A full bloomer.—Rose of Sharon.



A beautiful Hibiscus blooming on a country school ground this fall.

Helps in the Study of Nature

For identifying wild flowers:—

Schuyler Matthews' Field Book of American Wild Flowers.

For common birds:—

Schuyler Matthews' Field Book of Wild Birds and Their Music.

For moths and butterflies:—

Mary C. Dickerson's "Moths and Butterflies."

For general work in nature:—

Kelley's Short Stories of Shy Neighbors.

Hodge's Nature Study.

FOUR BOYS' EXPERIMENTS WITH SOILS

Four boys who were members of the same country school had read about how the soil had been formed by glaciers; they had seen the soil on the hillside farm gradually removed by tiny streams and deposited on the near-by level farm. They had noticed the effects of freezing and thawing on high banks and the sides of ditches. But there were some facts about soil which they knew only by what they had read. Each one resolved to contribute some simple apparatus which would be needed in making some simple tests of the truth of statements made in the books.

With lamp chimneys, thin muslin, and some flat bottomed pans they planned to find out for themselves how rapidly different kinds of soil permitted water to pass through them. After tying the muslin on the bottom of each chimney they filled one with very black soil (humus), one with clay, one with loam, and one with sand (each containing the same amount of soil); to the upper part of each chimney they tied strings which served as bails through which to run a broomstick. Each end of

A well pruned Catalpa in full bloom.

A township high school building at Monclova, O. A well kept yard and house.

the broomstick rested on the seat of a desk. The pans were placed beneath the chimneys. At the same time, exactly the same quantity of water was poured on the soil in each chimney.

Through which do you suppose the water ran most quickly?

Which was the last to permit it to run through?

Which one held the most water?

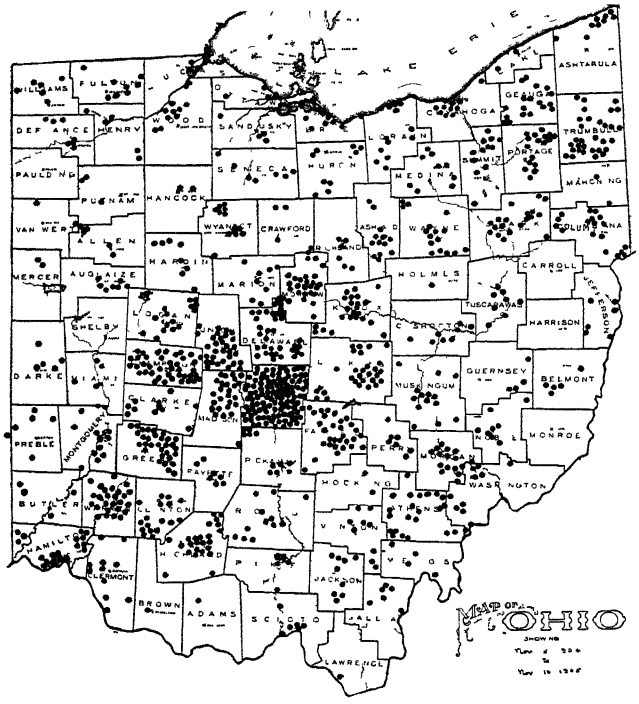
Which one retained the least water?

On another day they filled the same chimneys with the same kinds of soil—humus, clay, loam and sand—and set each one on two small chips on the bottom of the flat pans. Instead of pouring the water into the chimneys, they poured the same quantity into each pan. They did this to learn from the experiment which soil would allow water to rise most rapidly. Through which do you think it rose most rapidly?

The next Friday morning each boy had a common thermometer and a good sized tin can. Into each can was placed the same kind of soil. In the center of each of two cans the thermometers were placed deep enough to allow the freezing point to be just above the soil; in the other

two they were deep enough to allow them to remain upright. At the first recess the temperature of each was read and noted. Into the can containing a deeply covered thermometer and into one having the thermometer not so deeply covered, the same quantity of water was poured. The other two cans of soil remained dry. At the close of school the thermometers were read again. Which soils showed the highest temperatures? Which the lowest?

At another time they punched holes at different heights in the sides of some old tin cans; the cans were then filled with the same kind of soil and the same quantity of water was poured into each can. It was observed that little or no water ran through the holes while it was flowing



Map showing where boxes of State Traveling Library were last year. Thirty to forty books in each box. Why not have a box in each district school?

downward through the soil, but as the soil became oversaturated from the bottom upward the water began to run out. The bottom of the can represented a blue clay, hard pan, rock, or any other hard layer through which water could not easily pass. The hole in the can represented the underground drain through which what water the soil could not hold would flow away. They learned that the soil, like a sponge, will hold only a certain quantity of water.

Do you suppose they concluded that tile drains should be made shallow or deep? What do you think they learned about soils having gravel or sand sub-soils?

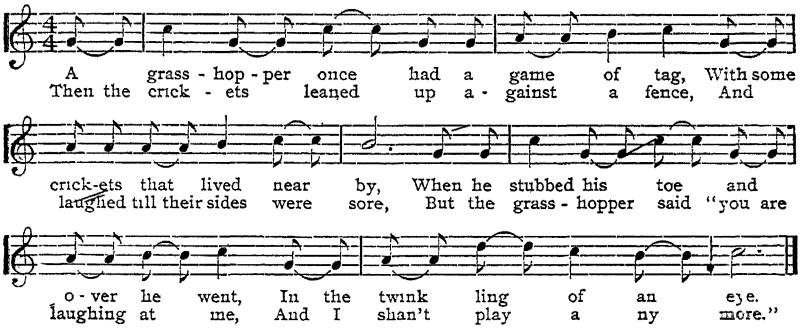
The next week these boys came to school with small strips of litmus paper furnished them by the College of Agriculture, some clean saucers, and some samples of soil taken from different places. One touched some vinegar (acid) with the litmus paper to see what change would be made in its color; one touched some lemon juice; another placed a piece against a raw slice of tomato. Then they touched some dampened soda, wood ashes, and lime. These they found to be alkaline; that is, they acted much like lye. They learned that by carefully mixing a little lime water and vinegar that no change in the color of the litmus paper would be made. They had read that such a substance was said to be neutral. They learned that the cistern water was neutral.

The samples of soil were separately mixed with rain water to a stiff mud, and a piece of litmus paper pushed into each and allowed to remain two or three minutes. Three found that their papers were darkened from being wet, but that there were no marked changes in the color. The soils tested therefore were neutral. One boy found his paper turned a brickish red. That was decided to be an acid or sour soil. It was learned that it needed draining or liming, or perhaps both, to neutralize it.

The most impressive lessons these boys learned was from what they did, rather than what they read. What these four boys did any other boys of the upper elementary grades in any Ohio country school can do.

M. H H

A GAME OF TAG.



So off he went tho' he wanted to stay,
For he was not hurt by his fall
And the gay little crickets went on with the game,
And never missed him at all.

A bright-eyed squirrel called out as he passed,
Swinging from a tree by his toes.
"What a foolish fellow that grasshopper is
Why he's bit off his own little nose"

Selected from Howliston's Child's Song Book. Used by permission of American Book C

WHAT SHOUTS FROM THE MOUNTAIN?

W. A. O